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Method for Producing a Shaped Foam Body, Especially a Foam Padding Element for a Vehicle Seat

The invention relates to a method for producing a foam body part, especially a foam padding element for a vehicle seat, which is provided with at least one adhesive closing part with adhering elements, wherein the adhesive closing part is arranged in a foaming mold producing the foam body part in such a manner that the adhering elements are protected against the penetration of foam by a foam-inhibiting covering which is arranged on the side of the adhesive closing part opposite the adhering elements with a predetermined border width overlapping the surface area of the adhering elements and is brought into releasable contact at least with parts of the foaming mold by means of a magnetic holding device, and the covering is provided with ferromagnetic component parts and at least one permanent magnet is provided on the foaming mold.

One method of this type is already known from the document WO-A-86 03164. One drawback with the known method is that the adhering elements of the adhesive closing part are not securely protected by means of the foam-inhibiting covering against a penetration of foam material. In order to guarantee the capacity of the adhesive closing parts to function, however, it is essential during the foaming process

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that adherence of the adhesive elements to each other by penetrating foam material be avoided.

Starting from this state of the art the invention proposes a method which facilitates the production of shaped foam bodies with adhesive closing parts foamed into the foam in an especially secure manner, whereby particularly the danger that foam material penetrating into the area of adhering elements leading to an adherence of the same is avoided.

With one method of the aforementioned type this problem is solved according to the invention in that the covering is provided with a ferromagnetic coating and that permanent magnets are used on the foaming mold in such a layered arrangement that they cooperate with the borders of the covering overlapping the surface area incorporating the adhering elements.

In an advantageous manner then the borders surrounding the area of the adhering elements are held in these border areas by effective magnetic forces in tight, sealing contact on the foaming mold, so that the sealing effect is guaranteed directly on those border areas endangered by penetration of foam material.

With one method known from the document US-A-5 654 070 for the foaming of adhesive closing parts on foam body parts, the arrangement of permanent magnets on the foaming mold along the side borders of the adhesive closing parts is already known in and of itself. With this method however adhesive closing parts are used without any sort of ferromagnetic component parts. Instead, with this method special, flexible plastic strips are provided as side sealing strips, which contain a magnetically attractable material in powder form. On the basis of the required precisely adapted application

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of these special sealing strips the execution of this method is costly and not cost-effective.

Preferably with the method of the invention the adhering elements are held during the foaming process in a recess worked in the shaping wall of the foaming mold, over the borders of which the covering overlaps with a predetermined border width sealing off the foam, and the recess is brought into contact with the border areas by means of the holding device.

The covering can be provided with a ferromagnetic coating of polyurethane, as is commercially available under the name SU-9182 from Firma Stahl and contains mixed-in Fe particles of granular size < 10μ as ferromagnetic material.

As part of the magnetic holding device associated with the foaming mold the permanent magnets can be for example in the form of a series of magnetic rods or magnetic strips, which surround the recess formed in the wall of the foaming mold, in which are held the adhering elements of the adhesive closing part to be inserted in the foam.

Another object is an adhesive closing part which can be foamed into a foam body part, which has the features found in Claim 8.

Hereinafter the invention is to be described in greater detail relative to the drawing. In the drawing are shown :

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Fig. 1 a diagrammatically simplified perspective view of a foam padding element with adhesive closing part in the foam, seen in perspective view from the end;

Fig. 2 a view similar to that of Fig. 1 of a foam padding element with an adhesive closing part inserted in a recess in the foam;

Fig. 3 a partial section indicated in enlarged scale of an adhesive closing part inserted in a foaming mold;

Fig. 3A a greatly enlarged cutout of the area A of fig. 3;

Fig. 4 a perspective of a cutout of a foaming mold with inserted adhesive closing part;

Fig. 5 a diagrammatically simplified perspective view of a mold part which can be inserted into a foaming mold to form a blowhole or channel in the foam, and

Figs. 6 and 7 perspective views of the mold part of fig. 5 with adhesive closing part partially or completely engaged thereon.

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In the example of Fig. 2, adhesive closing part 3 is embedded in the foam in a recess 7 of foam padding element 1, so that the adhering elements 5 are arranged not flush with the surface.

Figs. 3 and 4 clearly show the foaming-in of adhesive closing part 3 in an arrangement running flush to the surface of foam padding element 1. In this case a foaming mold is used of which the shaping wall 9 has a recess 11 in the area of the adhesive closing part 3, which is adapted to the surface area of adhering elements 5 of adhesive closing part 3, so that with engagement of the same on wall 9 of the foaming mold, adhering elements 5 are received in recess 11. As shown in detail in Fig. 3A, adhering elements 5 are connected by means of an adhesive layer 13 forming a tight adherence with a covering element 15 laid out as a thin lamina on adhesive layer 13. This consists of a material which will enter into good binding with the foam material, for example a fleece or a felt. Covering element 15 extends out with its outer border areas over the surface area of adhering elements 5 and recess 11 constructed in wall 9 of the foaming mold, whereby the overlapping border width of covering element 15 is selected to be such that the border areas overlap the permanent magnets, which are represented in Figs. 3 and 3A as magnetic strips 17. Covering element 15 is provided with a ferromagnetic coating, for example a polyurethane coating with added Fe particles, whereupon ferromagnetic properties are ceded to covering element 15, so that the border areas adhere detachably to magnetic strips 17. This contact of the border areas of covering element 15, around the area of the adhering elements 5 held in the recess 11 of wall 9, forms a foam seal, which during the foaming process prohibits any penetration of the foam material into adhering elements 5.

The tight connection of adhering elements 5 with covering element 15, in deviation from the diagrammatic representation of Fig. 3A, can also occur directly through a polyurethane coating containing ferromagnetic substances, which can be for example the polyurethane SU-9182 of Firma Stahl. Alternatively, an additional adhesive layer 13 can be provided on the ferromagnetic

coating, for example a layer of a moisture-crosslinking polyurethane, for example Tivomelt 9617-11 of Firma Tivoli. As another possibility the construction of covering element 15 in the form of an adhesive base layer directly supporting adhering elements 5 can be considered, for example an adhesive base layer which contains synthetic resin or polyurethane together with ferromagnetic substances.

Fig. 4 shows the use of a plurality of magnetic rods 21 instead of the magnetic strips 17 shown in Figs. 3 and 3A. Magnetic rods 21 in Fig. 4 are arranged in a ring around recess 11 in wall 9 of the foaming mold in such a manner that the edges of the ferromagnetic covering element 15 are held to wall 9 in sealed contact.

Figs. 5 to 7 show in detail the process of the so-called blowhole or channel formation in the foam, whereby adhesive closing part 3 is set into recess 7 of the relevant foam padding part 1. For this purpose a mold part 23 is used which can be anchored to wall 9 of the foaming mold, having the recess 11 worked into its surface, in which can be received and protected the adhering elements 5 of the relevant adhesive closing part 3. On the narrow ends of recess 11 are found magnetic strips 17 for the contact of the narrow side border areas of ferromagnetic covering element 15. As shown in Figs. 6 and 7, its longitudinal side border areas are fitted around the rounded edges 25 of mold part 23, in order to come into foam-sealing contact with side magnetic strips 17.